

Name: \_\_\_\_\_  
PC: Applications of Matrices and Determinants

Date: \_\_\_\_\_  
Ms. Loughran

Do Now:

1. Given:  $A = \begin{bmatrix} 5 & 0 & -3 \\ 0 & 12 & 4 \\ 1 & 6 & 3 \end{bmatrix}$  and  $B = \begin{bmatrix} 10 & -5 & 5 \\ 30 & 0 & 10 \\ 0 & 10 & 1 \end{bmatrix}$

- (a) Find  $AB$ .
- (b) Find  $\det(A)$
- (c) Find  $\det(AB)$

The **area of a triangle** with vertices  $(x_1, y_1)$ ,  $(x_2, y_2)$  and  $(x_3, y_3)$  is given by

$$\text{Area} = \pm \frac{1}{2} \text{determinant of } \begin{bmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{bmatrix}$$

where the symbol  $\pm$  indicates that the appropriate sign should be chosen to yield a positive area.

1. Find the area of a triangle whose vertices are  $(1, 0)$ ,  $(2, 2)$  and  $(4, 3)$ .

2. Find the area of a triangle whose vertices are  $(-3, 5)$ ,  $(2, 6)$  and  $(3, -5)$ .

**Test for Collinear Points:** Three points  $(x_1, y_1)$ ,  $(x_2, y_2)$  and  $(x_3, y_3)$  are collinear (lie on the same line) if and only if

$$\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix} = 0 \quad (\text{the determinant} = 0)$$

3. Determine whether the points  $(-2, -2)$ ,  $(1, 1)$  and  $(7, 5)$  lie on the same line.

4. Determine whether the points  $(3, -1)$ ,  $(0, -3)$  and  $(12, 5)$  are collinear.

The test for collinear points can be adapted to another use. If you have two points on a rectangular coordinate system, you can find the equation of the line passing through the two points.

5. Find an equation of a line that passes through  $(2, 4)$  and  $(-1, 3)$ .

6. Find an equation of a line that passes through  $(4, 3)$  and  $(2, 2)$ .

Homework: Textbook pp.646-647 #s 5, 7, 23, 25, 27, 29 (For 23 and 25, determine if those points are collinear without your calculator.)

